

Friday, October 21, 2016, 4:10 pm

COLLOQUIUM TALK

Speaker: A.J. Hildebrand (UIUC)

Old Main 2231

Benford's Law

Abstract:

In many real world data sets, the leading digits $1, 2, \dots, 9$, do not appear with equal frequencies, but rather have frequencies given approximately by

$$P(d) = \log_{10} \left(1 + \frac{1}{d} \right), \quad d = 1, 2, \dots, 9. \quad (1)$$

Thus, for example, digit 1 appears as leading digit about $\log_{10} 2 \approx 30.1\%$ of the time, while digit 9 appears only about $\log_{10}(10/9) \approx 4.6\%$ of the time.

The digit distribution (1) is known as *Benford's Law*. It has been found to be a good match for a wide range of real world data sets, from populations of world cities to heights of tallest buildings, to numbers in tax returns and accounting statements.

In this talk we give an overview of Benford's Law, and the mathematics behind it. We explain why the seemingly artificial distribution (1) is, in some sense, the most natural "universal" digit distribution, and we show that the Fibonacci numbers, and similar mathematical sequences, satisfy Benford's Law. We conclude by describing some recent results and conjectures from an ongoing undergraduate research project at the Illinois Geometry Lab.

The talk is aimed at a broad audience, including undergraduates who have had some exposure to elementary probability and real analysis.

SNACKS IN FACULTY LOUNGE AT 3:30 PM.
EVERYONE WELCOME (EVEN IF YOU ARE UNABLE TO ATTEND THE TALK)
